Simulation of Investigating the Earth and Universe Using Interactive Mobile Augmented Reality Based On Smart Evaluation

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Abstraction: **Smart evaluation augmented reality is the new path of peripheral for next generation and revolution. The rapid developing android application extended to video simulation solar system and its planetarium. This phenomenon is integrated on smart phone for student learning purpose. AR-SS (Augmented Reality Solar System) application brings the fun and plenty of general knowledge for our curious of solar system. This paper explores on how AR-Mobile application help to knowledge formation primary school students when they learn solar system from their practical science book.**

Index Terms - Simulation image, Augmented Reality, Investigating universe, Mobile phone

I. INTRODUCTION

Last a few decades ago using mobile application in hand held device was just discovered as part of the key to access facilities to utilizable application, but nowadays it become one of the largest platform application in a proper implementation on smart phone. The most accessible smart phone application can create large marketable product among cybercitizens. Displaying real time digital information on smart device as seen through its display with augmentation image is called Augmenter Reality [4]. Mobile Augmented Reality (MAR) is a new emerging display paradigm allowing virtual content to be displayed in a way that gives the illusion of co-presence of the real and virtual [5].

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Camera captures the basic form the image of markers in real environment and augmenting with information in display to projecting the reality of image. At the same way, we mainly focus AR-Solar-System on smart phone for practical science book. The objectives of our papers are astronomical elements that some kinds of natural phenomena usually investigated by humans. Visual aids like mobile display just maintain the role to visible the image based on marker.

II. VISUALIZING AR-SOLAR SYSTEM IN SMART PHONE

It is obvious that human visualization can create contemporary imagination to observe real object. Human curiosity brings passionate to any rare objects like solar system planets, orbit and its visibility on mobile screen. The contextual experiences confirm the name of planet through phone display when user observed the rotation of planets on space. To have knowledge formation visual immersion and interaction are both important aspect in augmented reality [3]. Since our solar system is continuous moving so student as an observer of this application acquire the knowledge of solar system from continuous live video. Continuous augmentation live video of solar system help to recognized latency that reducing about 1 second which referred as streaming MAR [5]. Sound beeping as audio function is additional features in this mobile augmented reality [7]. Different audio sounds play on different animation of planets so that it makes the users interaction for its specification. This developing application applicable to any android based device but it is recommended to use in mobile phone for its practical experiment purpose.

III. USING THE AR TECHNOLOGY INVESTIGATING THE EARTH AND UNIVERSE IN MOBILE PHONE.

As we are human our visual system is very sensitive to distinguish of object form real environment. So, the display of mobile phone will be represented the solar planet with information and animation. Observation process in mobile display will be simulated to observer based on marker and it's realistic. It will focus on providing an intuitive educational book, which supports natural interaction with sustaining accessible virtual objects while user interacts with mobile display mechanisms. Researcher found that boring courses

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have a high withdrawal rate, which will be avoided by using new technology like Augmented Reality.

IV. Problem Statement

The most significant practical book for science is used by students for their practical class with real world experiment. Nowadays, portable devices are available in our daily life as utilized by varieties application. So we just expand our attempt for school practical book where student gain virtual knowledge beside their studies with practical experiment. However, it would be advanced processing experiment for school student where student spared their won knowledge not only the practical but also with augmented images used by mobile phone. It is obviously expectable for student with learning interest. That's why, we apply enquiry based learning theory through mobile application to solve this application problem [8]. Based on our developing AR-SS application the question might be come up by using tiny mobile phone with AR. How students can learn their study materials require displaying huge space. The solution we may solve in two ways. By giving the two options from smart phone display once student learn from text book and directly access the image of AR-solar system. Other option students directly access the AR-solar system from smart phone without accessing any info like their text book. But based on problem statement we decided that our application with text based AR-solar system that can be help in two ways. So in the learning process school students acquire animation images and information from the smart phone.

Next step we describe the details of learning theory how it could be implemented on mobile application for learning purpose. The practical text book is bit changeable for application. The description will be printed beside the markers and those markers will be held the augmentation images of solar system.

V. Problem solving with MAR application for school practical text book.

The most sophisticate part to develop in mobile application is tracking and registration accuracy for its generated high-quality images on phone display rendering of the virtual objects precisely with the real world [2]. At a time, the real world and virtual world objects will be represented in a single display in hand held device. However this hand-held display could be user friendly like mobile phone or PDA. Video image in real time processing is capable to display with 3D image in virtual environment that fully support to mobile AR-Solar system. Practical science book contains marker figures which are contrasted from their background that can be augmented using the proposed like solar system planets image [6]. Solar system MAR application is available on application website so that student can easy to download and integrated on smart phone or PDA for their practical knowledge. The integrated solar system application well organized to learn solar system for student, because all those planets are far distance from our earth. So when student see to their phone display is presented the images of planet they would be realized at instance moment of its practical objects and natural phenomenon of solar system in universe.

VI. Measurement of Markers in school practical text-book.

When the markers are placed onto the ceiling or somewhere, it is inconvenient to measure the transformation of these markers manually. Therefore, we developed a simple measurement tool to generate the configuration of all the markers. The idea of this work is very similar to that of the calibration of two cameras. One can consider that each marker defines a local coordinate system and its configuration is corresponding to a transformation matrix to the world coordinate system [11, p-96]. If the users move around and view in a large working space with same book then it should be a good choice the commercial tracking systems. But these commercial systems often cost effective, so the users as a school student may not be willing to afford it. For this reason we just give up this method in our AR-SS application.

VII. Enquiry based learning theory on Solar-system application.

A. Learning theory

To implement the learning theory is more understandable for application purpose. Enquiry based learning theory is selected for this application. Because enquiry based learning theory [8] categorized in four types and followed on Mayer Principle and Gestalt theory of perception. These four types are confirmation Enquiry, Structured Enquiry, Guided Enquiry and Open Enquiry. Among those Guided and open enquiry is perfect to implement the AR-SS application.

Mayer principle provided multimedia principle, spatial contiguity principle, Individual difference principle, modality principle and many more. Among those we select only modality principle (Figure 1) because modality principle as effected as cognitive where auditory and visual working memory can be used at a same time [9]. On the other hand, Gestalt theory of perception is recommended for figure, ground, area and similarity [12, p-3]. However, our developing application is followed the appropriate principle based on enquiry learning method. Guided enquiry student [8, p-28] have opportunities to bit research and design the procedure (Method) to test their question and resulting explanations. In this process student have numerous opportunities to learn and practice different ways to plan experiments and record data. Open enquiry bring the creativity from student and that's way student have the purest opportunity to act like scientists, deriving questions, designing and carrying out investigations and communicating their results. Indeed, this level bear the greatest cognitive demand from students by analyze data visualizing images from each step [8].

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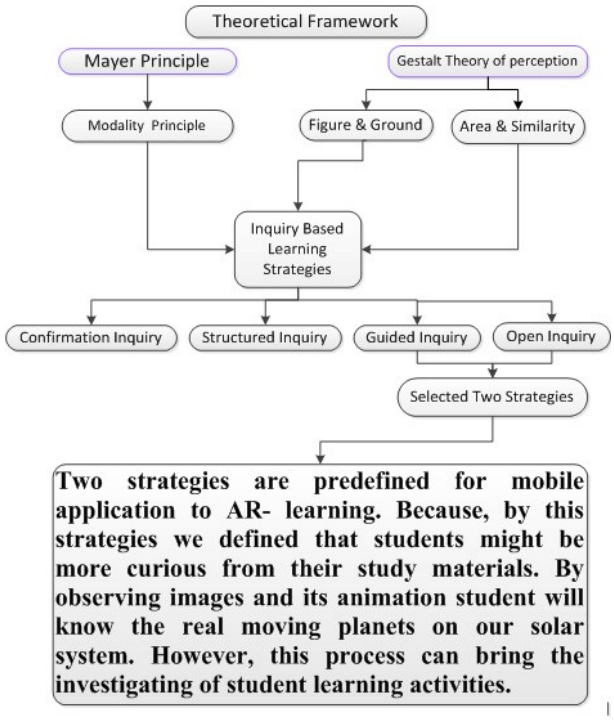

Figure 1: Learning theory strategy

B. *Platform*

We followed the visual cognitive, so that the application hold video images which able to interact with novice. However, student can perform the visualization by commend on touch screen as many as they want.

Table 1: Software Specification for AR-SS application

Software Specification		
No	Item	Specification
1	OS	Windows Vista
2	Developer	AR- Tool Plus
3	Language	C++, VRML, OpenGL
4	Phone OS	Android, Samsung GS-2
5	3D Modeler	3D Max09. Direct3D

C. *Hardware requirement for its design and Architecture*

We develop the method that contains the AR solar system. The system we constructed on smart phone as well as other devices like PDA or tablet PC. But our mission is implemented to smart phone. Since hardware device is always upgraded so this application will perform on Samsung Galaxy S-II which is smart device operated with Android OS-2.3 version. The phase develops the six design phase which is 3D objects, 3D animation, and phone touch screen and finger interaction on display.

D. *Prototype & visualizing planets with AR*

The books we prepare for school students to learn solar system by mobile application is become one of the excitement studies for students. Because we prepare the book with marker based beside the description of our solar system. So when students study the book and hold the mobile phone on the specific marker then mobile display will augment the planet based on description (Figure 2). Book will be printed location based information system in the form of text and images can also be viewed at a same time. Each student has a unique marker shape to identify his/her trails, see Figure 1 with T and L shape markers. We set the trails to record the position during the period of description, which allows a suitable point distribution along the path taken, assuming that movement at a constant rate based on marker position in book [10].

Figure 2: Example of Augmented Reality solar system

VIII. Methodology

The numbers of projects have drawn on the potential for augmented visualization offered by mobile technologies. The use of visualization technology is well established in digital product heritage. [Bernadette Flynn, 2008]. This project development methodology is based on mobile Augmented Reality application that support to Iterative process with augmentation image beside the description of solar-system on text book or web-site. However, Visual Cognitive Software Development Life Cycle (VCSDLC) method will be implemented on the application in mobile learning. The process is enquiry based learning application because any user learn with curious that collaborative enquiry learning environment.

IX. Research Operational Feasibility and Objectives

The purpose of the project is to improve learning process is categorized on school text-book. According to study in class room student complete to determine how acquire knowledge and their learning capabilities are affected with the introduction of 3D virtual objects. Students better understand the curriculum with short time. In this enhanced learning environment, students pay rapt attention and over more material in less time than other process.

According to our new developing application the objective of research points are given below.

(i) To study the suitable method of designing and developing solar system planet shape contents in the mobile phone

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based on Constructivism Method of learning and showing the related information.

(ii) To develop the Mobile Augmented Reality application as an observation of astrological student to enhance the learning based on Augmented Reality Solar System Iterative process - Visual Cognitive Software Development Life Cycle (AR-SS-I-VCSDLC).

(iii) To observation and simulation process of smart phone application using Simple Usability (S-Usability) Testing system with marker.

X. Discussion and conclusion

The boundary of Augmented Reality is unlimited since it just began from new technology smart phone and some other PDF. Our attempt was the single step for school student to help practical observation. Near future we extended the new application features for planetarium system. We also developed website that can be provided the available application for science experiment as well as solar system application.

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